

Stories from the field

Protecting smallholders' food security by improving soils



The resilience of farming systems to climate change and variability depends upon healthy soil. Millions of African farmers lack the money, technologies, livestock and time to maintain their soils as well as they would like. Infertile soils give poor yields which in turn deepen poverty.

Since many smallholders do not have access to agricultural inputs and markets for their products, they cannot sell enough of their produce to allow them to put something back into the soil. Structural adjustment programs, out-migration of male workers, HIV/AIDS, rapid social change and prevailing food aid initiatives have all disrupted or removed robust traditional safety nets and the institutions that supported them, adding to the pressures on farming communities. Women, children and the elderly are vulnerable to the increasing variability in seasonal rainfall patterns and weather conditions and the more frequent and extreme droughts in eastern and southern Africa.

Climate change will force farmers to change their agricultural practices, adjusting crops, crop varieties and the timing of farming operations. Rural societies and governments will have to design alternative food supply systems. Yet African farmers are not helpless in the face of these multiple stresses and the added risks and uncertainties that climate change brings. By working together to save

Researchers and farmers evaluate alternative crop varieties in Zambia. Photo courtesy of P. Mapfumo, University of Zimbabwe

time and labour and identify shared problems, and by working with scientists and extension workers to test new ideas and techniques, they are showing that it is possible to increase food security.

Researchers, led by the University of Zimbabwe, are involving farmers in testing the principles of integrated soil fertility management (ISFM) in seven sub-Saharan countries – translating science into practical innovations for farming. Using field-based learning centres, researchers, input suppliers and farmers are working together to identify options that fit a range of farming circumstances. The resulting co-learning processes have encouraged farmers and service providers to identify and test crop types and varieties most likely to ensure food security under increasing climate variability. Drawing from both farmers' indigenous knowledge and emerging scientific knowledge from conventional research, communities are mobilizing institutional support for preferred combinations of soil management options and cropping practices.

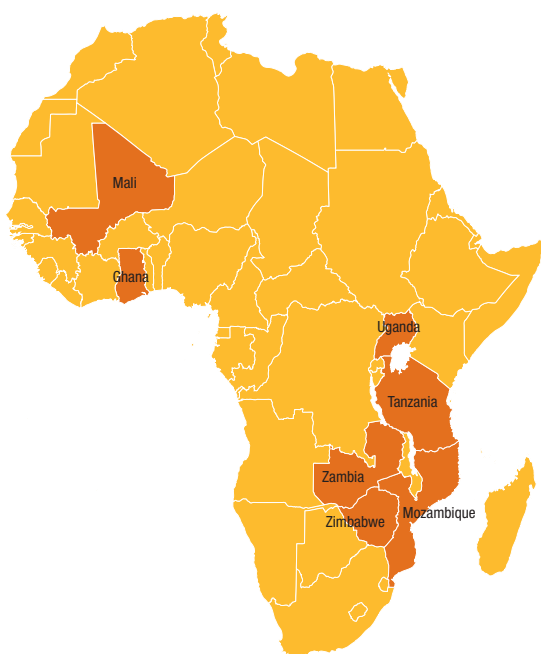
Community vulnerabilities and the effects of climate change are uneven, so the project tests options in varying agro-ecological zones and farm types. The team aims to find “best fit” options –



These farmers were pleased with the bumper crop of maize they produced on sandy soils using ISFM approaches. *Photo courtesy of P. Mapfumo, University of Zimbabwe*

instead of “one-size-fits-all” technologies – based on a detailed analysis of the specific farming context, including household goals, aspirations and resources as well as the bio-physical environment.

Figure 1: Research took place in Ghana, Mali, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe.



Researchers, suppliers and smallhold farmers identified and tested options to improve soil fertility in seven African countries.

After two years of capacity building and co-learning with farmers, service providers and other strategic partners, the research project is now in its final stage. In 2009 the team focused on identifying and consolidating the lessons learned from field-based learning centres that can be sustained to benefit smallholders in the context of a changing climate. Participants involved in earlier action research are now translating their acquired knowledge into coordinated action. As researchers wind down their field activities, they hope to see extension agents, local leaders and other district level actors champion the ongoing processes of community organization and take over the management of learning platforms.

Here are a few examples of specific options now being taken up by communities, based on their shared learning through research.

In Uganda...

In Tororo district of eastern Uganda over the past two years, farmers have introduced small cereal grain crops such as sorghum into their farming system, realizing the susceptibility of the commonly preferred maize crop to declining rainfall. Rotation of the small grains with nitrogen-fixing food legume crops, in addition to combined use of organic and inorganic fertilizers, is allowing communities to stabilize yields of both cereals and legumes in the face of rainfall variability.

In Zambia...

In Kasama district, evaluation criteria developed by farmers proved the value of treating soil with lime to improve the podding of groundnuts and increase grain production. Northern Zambia has some of the world's most acid soils and liming can enhance the uptake of plant nutrients and the efficiency of added fertilizers.

In Zambia, women providing HIV/AIDS home care used liming and other ISFM practices to increase yields and improve nutrition.



Faces behind the research

*Paul Mapfumo,
Soil Fertility Consortium
for Southern Africa Coordinator
University of Zimbabwe*

Growing up on a small farm in Zimbabwe afflicted with poor soil, project leader Paul Mapfumo faced daily worries about erratic rainfall and a lack of food security. His quest for soil fertility solutions grounded in scientific evidence stems from a strong personal desire to end the suffering he has seen people endure, wondering when the next consignment of food aid would come.

Now with almost 20 years of scientific training and research on food security and natural resource management behind him, Mapfumo sees more worries on the horizon for African smallholders. Though they have long experience with drought and the uncertainties of rainfall, the impacts of climate change may overwhelm their usual coping mechanisms. In the multi-country project he has led since 2007, he has been surprised at the extent to which communities rely on indigenous knowledge to make their decisions on potential coping practices.

“I see an increasing band of vulnerable smallholder households, and widening knowledge gaps among these communities, their service providers and those who champion development – policymakers and development donors. The realities of a changing climate spell disaster for communities I know already struggle with perennial food deficits and limited options for livelihoods.”

The use of field-based learning centres, in a participatory action research setting, provided a novel opportunity for experimenting on integrated soil fertility management and related crop production technologies that respond to farmers' unique circumstances.

“The approach deepened service providers' understanding of farmers' challenges in adapting to climate change and variability. Farmers, in turn, recognized their strengths and weaknesses in finding measures to minimize the negative impacts of climate change while taking advantage of opportunities that can arise.”

“The study demonstrated that with good facilitation and knowledge sharing, the capacity of farming communities to mobilize and organize themselves can improve rapidly. They identified resources to adopt improved crop production technologies and took collective action to revitalize traditional social nets and gain access to agricultural markets. And they were able to draw the attention and contributions they needed from different policy-making levels. “



Chief Maparura of Nyahava played a vital role in helping to revive the traditional Zunde raMambo practice to increase food security for the poorest. *Photo courtesy of P. Mapfumo, University of Zimbabwe*

Following field testing of various liming options at the Mwambamulilo learning centre, farmers have taken up liming to increase productivity of groundnut-maize systems. More than 10 women's groups engaged in HIV/AIDS home-care initiatives are using the ISFM practices to increase groundnut yields to improve nutrition among their target beneficiaries. With facilitation support from the research team, farmers have mobilized local leaders and agricultural service providers to make lime and stress-tolerant groundnut and maize varieties more readily available.

In Zimbabwe...

In Zimbabwe, the research team established 42 learning centres across several communities in six wards, with the potential to influence more than 7 000 households. Reflecting farmers' interest in testing options that would produce well and improve food security under a range of stressful conditions, these learning

centres focused on different maize cultivars, planting dates, small grains and grain legumes. Co-learning began with a few learning centres but expanded when more farmers said they wanted to test in their own locations and circumstances.

In Nyahava, Zimbabwe, 18 villages used soil fertility improvements to revive a lost tradition to ensure food for the needy in times of famine.

Farmers in Nyahava in eastern Zimbabwe's Makoni district wanted to strengthen local safety nets that once protected community members in times of drought and other extreme events. Traditionally, chiefs had set aside land for collective production of staples that could feed needy households, such as those headed by widows, orphans or the elderly. The practice, known as *Zunde raMambo*, was eroded over time by a combination of food aid and declining soil fertility. Facilitated by an alliance of researchers, extension agents, seed and fertilizer suppliers and local authorities, 18 villages came together to till collectively a two-hectare parcel of land contributed by a local chief. The community mobilized to prepare land for maize, soya and cowpea production following ISFM guidelines developed at learning centres with the research team and other service providers. Yields improved dramatically – from less than 300 kilograms per hectare of maize grain to more than 4 tonnes per hectare – using a combination of organic and inorganic nutrients to address a severe deficiency of phosphorus and nitrogen and a medium-range maturing maize cultivar planted in expectation of normal rains. The results validated the villagers' efforts, and helped to renew faith in a lost local safety net. Joint reflection helped people understand the factors behind the earlier failure of their traditional system and the value of continuing their hard work to reinvigorate *Zunde raMambo*.

*The project "Resilience and the African Smallholder" illustrates progress towards CCA's outcome area 3: **The poor in rural and urban environments apply their experience of adaptation with the knowledge and technologies generated by research to implement improved and effective adaptation strategies.***